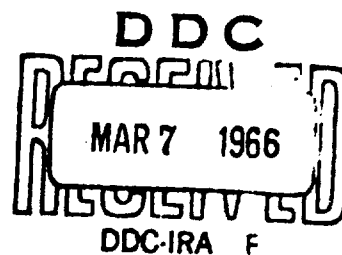


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10-64

Research Memorandum

**A Review of
Recent Research and Development on
Military Leadership, Command, and Team Function**

by

Meredith P. Crawford

7 September 1964

Paper presented in a panel on Contemporary Military Training Research at the annual convention of the American Psychological Association, as one of the "Special Invited Presentations: Psychological Research in National Defense, 1964" sponsored by the Division of Military Psychology.

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HUMAN RESOURCES RESEARCH OFFICE
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FOREWORD

The program for the 1964 annual convention of the American Psychological Association at Los Angeles included a symposium on "Psychological Research in National Defense, 1964," sponsored by the Division of Military Psychology. This paper was one of the Special Invited Presentations for this symposium, which consisted of a series of panel programs dealing with new concepts and techniques being developed in current research on military psychology.

Part A of the paper is a general introduction to the panel on "Review of Contemporary Military Training Research: The State of Training Technology and Studies of Motivation and Attitudes in Learning." Part B is a substantive section dealing with research in training for leadership, command, and team function.

Other presentations in the panel were given by Dr. Gordon Eckstrand, Behavioral Sciences Research Laboratory, Wright-Patterson Air Force Base, Ohio, who spoke on "Current Status of the Technology of Training," and Dr. Glenn L. Bryan, Office of Naval Research, Washington, D.C., who spoke on "Technical Jobs: What, When, and How to Train for Them."

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**A Review of
Recent Research and Development on
Military Leadership, Command, and Team Function**

A. INTRODUCTION TO THE PANEL PRESENTATION

During the past decade research and development in military training has broadened its scope. In 1951, Wolfle wrote, "The psychology of training is the applied psychology of learning" (1951, p. 1276). While he devoted some space to the question of what should be taught, that is, curriculum content, Wolfle's main emphasis was on those manipulable conditions which promote learning.

Since then, increasing attention has been focused on the study of the job, the team, the organization, and the man-machine system in which the trained man will operate. Recent outlines of the steps required to develop a training program (Crawford, 1962; Eckstrand, 1964) begin with a study of the system and the job. It may be fair to say that, during the last ten years, studies of the curriculum which have derived from examination of the job and the system have made greater contributions than research in training media. This assertion seems to ignore spectacular advances through programmed instruction. However, the precise determination of training objectives, based on job study, is usually fundamental to developing an efficient series of training frames for effective, job-oriented programmed instruction.

It is therefore difficult to draw boundaries of research in military training within which to present topics for discussion by this panel. In considering training research and development (R&D) from either the methodological or the substantive point of view, the ramifications of interest they engender are almost infinite. Related to methodology, which we may call the developing technology of training, are the areas of operations research and systems analysis, techniques of job analysis and task and skill analysis, the experimental psychology of human learning, studies of motivation and incentives, and the techniques of measurement of achievement and performance—in short, a wide range of concern within and outside the field of psychology.

The substantive studies—those leading to specific military training programs for current and future systems—embrace an equally wide range of related interest and information necessary to the training researcher. The researcher must know the particular military system and setting, current policies, trends, missions, and especially the personnel policies of the service or branch in which he works. In addition, he must keep abreast of actual or potential contributions to understanding and improving human performance made by fellow human factors scientists in selection, classification, human engineering, and personnel psychology, as these relate to his field of interest.

It is easy to sketch the broad panorama of the trained researcher's interests; it may, and I hope it does, challenge and excite the interest

of psychologists in this rewarding kind of work. It is, however, a much more difficult task to define limited topics for this panel. But one point has already been made. All the information to be presented in this symposium on Psychological Research in National Defense is grist for the mill of the psychologist whose business is to improve the training of officers and men who will carry out the multiple missions of our military establishment.

Fully realizing the vague boundaries of training research and development, this author undertook a cursory review of the open literature from about 1960 to see what titles would fall within his intuitive judgment of relevance to the topic. Grouping these titles offered a real problem. Developmental or engineering studies of particular training programs might form one category. The other would then include both methodological studies and the great mass of supporting information on the psychological variables which influence all sorts of behavior in military situations.

When members of this panel met to divide their assigned topic, we concluded, as I suspect did other authors in this symposium, that all material relevant to our topic would fill a large book. We decided to eliminate many topics and concentrate on a few. Certain major substantive topics were assigned to Dr. Bryan and to me, and the methodological and technological areas to Dr. Eckstrand. Substantive topics chosen are technical training and anticipation of training requirements (Bryan), and training for leadership, command, and team function (Crawford).

Following on this arbitrary dissection of the whole body, a few remarks are in order on what has been left out. For example, no review will be presented on recruit training. Some studies are under way in all three services, with a heavy concentration in this area by the HumRRO Training Center Research Unit at Fort Ord, where both research and consultation have been of use to the Army in significant changes now under way in the content and administration of basic training.

Again, work is going on in all three services toward developing and improving training programs for many occupational specialties. The extensive development of programmed instruction in the Air Force, reported by Ofiesh (1963), represents a major advance in training efficiency in that service. Recent work has been done in the Navy on doppler and sonar training. Under Army auspices, in addition to much work on electronics maintenance training, new curricula have been developed for the aerial observer, for the infantryman in land navigation and fundamental combat skills, for the operators of air defense equipment, and for vehicular mechanics.

Flying training is another area which will be omitted from our presentation. The Navy has, in recent years, produced studies in training for jet aircraft. The HumRRO Unit at the Army Aviation Center (Fort Rucker) has done research and development on elementary training in both fixed and rotary wing aircraft, problems of low-altitude, high-speed flying, and gunnery training in the armed helicopter.

Research on more general training matters neglected by this panel would include a few bits of data on motivation for training under

various circumstances, and the already large volume of literature on psychological considerations in the development of training devices. Many excellent papers on this topic have recently become available (as, for example, Smode, Gruber, and Ely, 1962, 1963), which summarize much information related to developing all kinds of training programs. This fundamental technology belies the artificial distinction between interests in training and in training devices.

Another large topic not being covered is work on training in many kinds of specific skills, usable in a variety of occupational specialities. Excluded, for example, are recent studies in foreign language training which use automated methods, research on training in perceptual skills, and studies on the determinants of transfer of training among related military programs.

It would also be useful, had we the time, to review the kind of statements of doctrine about training which are current in the various services. For example, a recent publication of the Air Training Command (1963) sets up a very forward looking system of parameters in which to plan new training for the Air Force. Also, in this connection, time could profitably be devoted to practical considerations involved in implementing the results of training R&D, and to theoretical problems arising from attempts to generalize from studies of the engineering type (see Finan, 1962).

B. TRAINING FOR LEADERSHIP, COMMAND, AND TEAM FUNCTION

INTRODUCTION

In deploying his forces for strategic or tactical purposes, the military commander must assess the strength, equipment, and readiness of units. He is almost equally concerned with the capabilities of their commanders. In similar fashion, current research in leadership, command, and management and in the structure and functions of teams, units, and organizations reveals the intimate relation of fact and theory about the function of the organization and its head. While military psychologists have shown an increasing recognition that the group and its leader must be considered together, particular investigations have generally concerned either leadership and command or teams and units. Because military units are filled by pipeline streams from many combat, technical, and command training programs, this division of research and development in our laboratories has been a natural consequence.

Although studies reported in this presentation will be divided between leadership and command on the one hand, and team training on the other, I hope that evidence that researchers have not compartmentalized their thinking will be apparent.

Studies pertaining to command will be further subdivided between those which emphasize the interpersonal aspects of command, connoted by the term leadership, and those which relate to training and organizational and technical responsibilities. A further cut will be made in each topic between research and development. For this discussion, studies aimed at obtaining information about the function of commanders and units will be classified as research. Efforts to build specific training programs will fall under development. Finally, one further distinction will be made between studies on command; those pertaining to noncommissioned officers will be grouped separately from those on officers.

These rather artificial categories have been chosen to avoid a dull recital of abstracts and to call attention to one set of relationships. Disadvantages of the classification scheme include the splitting of accounts of many investigations which have proceeded through an orderly sequence of research and development. Also, the division between work on NCO's and officers may obscure many communalities in their functions. Perhaps we can tie some related threads together at the end.

INTERPERSONAL ASPECTS OF LEADERSHIP AND COMMAND

Papers presented at the Conference on Leadership and Interpersonal Behavior at Louisiana State University in 1960 comprehensively summarize research during the 1950's, particularly that under the sponsorship of the Office of Naval Research. Conference proceedings, edited by Petrullo and Bass (1961), are rich in coverage of theoretical points of view and empirical data from laboratory and field situations. This book represents a starting point for the present review.

One of the most important contributions of this publication to an understanding of military leadership is found in the many instances where leadership function is viewed in terms of the total organization (chapters by Chris Argyris and by Rensis Likert). The reports by M. Dean Havron and Joseph E. McGrath of work on leadership in small military units are most relevant, as are those by John C. Flanagan on work by the American Institute for Research in leadership and small groups and Fred E. Fiedler's concise account of his several studies on the "assumed similarity of opposites" variable.

Another background reference to the work in the 1950's is Hahn's bibliography, (American Institute for Research, 1961b). The titles on leadership research are divided among characteristics, skills, acts, and training. Only some ten percent of the references concern training.

Research on Leadership Behavior

Noncommissioned Officers

An important earlier study on leadership and squad effectiveness in Korean combat was not included in either of the above reviews. Clark (1955) and his team interviewed the members of 81 rifle squads on the front line during the winter of 1953 to determine some of the factors related to effectiveness of squads.

Sociometric indices were obtained of group cohesiveness, patterns of acceptance among squad mates and of platoon members outside the squad, and interactions related to sociability, fighting, and recognition of military skills. Two criterion measures of squad effectiveness were developed: (1) a weighted composite of ratings made at the battalion, company, and platoon levels, and (2) results of a Q-sort of records of squad behavior made by officers with recent Korean combat experience at the platoon level.

Detailed descriptions developed for 69 of the squads revealed consistent performances of individuals which were classified as five leadership functions: (1) managing the squad, (2) defining rules and procedures for appropriate behavior, (3) performing as a model, (4) teaching squad mates, and (5) sustaining squad mates with emotional support. These functions occurred in the various squads with differing frequencies; managing was observed in all but two of the total 69 squads. Defining occurred in 52, and the other three functions were seen in from 25 to 30 squads each.

The occurrence of these functions in squads was positively related to both combat criteria, significantly so to the Q-sort measures. Only one squad leader performed all five. The assistant squad leader often carried out the management function, while defining, modeling, teaching, and sustaining were done by leaders, assistant leaders, or other squad members. In theoretical terms, Clark saw these leadership functions as acting on the squad's value structure and thus indirectly affecting performance. Indices of these value structures, derived from sociometric choices relating to sociability, fighting, and crediting each other with skills, showed some significant relations with the combat criteria.

Since 1960, a number of studies of Navy petty officers have appeared. In the first, a questionnaire survey was made of the utilization of 1690 petty officers (Bureau of Naval Personnel, 1960). It was found that superior ratings of job performance were awarded in greater frequency to graduates of the five-week schools than those of the one-week schools. Raters believed the schools to be effective in teaching leadership, although no information was given on how students were selected. Another study (Mayo and DuBois, 1963) indicates a gain in leadership rating following schooling.

Concerning important behavioral characteristics of petty officers, three studies provide some information about the influence of petty officers on their men. By means of questionnaires answered by officers, CPO's, and subordinate enlisted men, Spector, Clark, and Glickman (1960) obtained some information on characteristics of CPO's which influence attitudes and morale of their men. Analyses revealed two of five factors to be of consequence: first, the CPO's regard for the regular Navy and, second, consideration shown his men. The first was positively and the second negatively related to subordinate expressed interest in a Navy career.

Two studies by Kipnis and his associates (Kipnis, Lane, and Frankfort, 1961; Kipnis and Lane, 1962) examined the kinds of actions petty officers took when they judged that a man's performance was below Navy standards. One study indicated that senior petty officers tend to deal with men on interpersonal terms while junior PO's characteristically passed the problem up the chain of command by informal or formal action. In the second study this relation to rank was not significant, but there was evidence that those of any rank who indicated greater self-confidence in their leadership abilities on a special test form, tended to deal interpersonally.

In 1961, Hahn and his AIR associates gathered critical incident data from petty officers during the research phase of a training development project (Trittipoe and Hahn, 1961). He was able to classify these incidents into eight kinds of problem situations, including assignment and supervision of work, training, discipline, technical competence of men, and personnel and emergency actions.

With Army NCO's of infantry and artillery teams, Ziller (1963) found a small positive correlation between the leader's assumed similarity score and ratings of team effectiveness. To explain this divergence

from Fiedler's findings, Ziller assumed that Army NCO's have little choice of subordinates so they devote their efforts to promoting the proficiency of all unit members rather than to selecting superior ones for intensive development. Such variations from earlier findings on the assumed similarity of opposites are also reported in a recent paper by Fiedler himself (1963). However, with West Point cadets in competitive squad problems, Gottheil (1963) found evidence for the negative ASO relationship, as well as positive correlations between various leader attitudes and squad morale.

An experimental study using ad hoc four-man groups of Army enlisted men of various grades has just been completed by Drucker (1964). He appointed leaders and conveyed different degrees of power, authority, and responsibility to each. The teams worked at a signal monitoring task and three cognitive tasks for one day. First-order relations between the three leader variables and team performance were few, but combined effects of authority and responsibility appeared on different tasks.

At the outset of a comprehensive R&D program for leadership training of potential Army NCO's, Hood and his associates at the HumRRO Unit at Fort Ord did a large amount of background research (Hood, 1960). One study accomplished a survey of the programs and methods in noncommissioned officer academies (Kern, 1958). The teaching of leadership principles rather than the provision of some kind of practice in leadership acts characterizes the main features of programs designed to build NCO confidence. In a second study (Showel and Peterson, 1958), a total of 3960 critical incidents were obtained about squad leaders from 135 supervisors and a like number of subordinates in four infantry divisions and an armor cavalry regiment in Europe. Sorted into nine categories, these data provided considerable insight into typical NCO behavior as seen from above and below. Particular attention was paid to conflicts in role, resulting from the NCO's intermediate command position. Several other minor studies of NCO behavior were also made. In addition, a training guide for potential NCO's was prepared from these studies (U.S. Continental Army Command, 1963).

Officers

To gather background information for development of leadership training, Lange, Jacobs, and their associates carried out two studies to answer the question, "How does the leader function to maintain high motivation and high standards of performance among his followers?" (Lange, 1962, p. 286). They took the view that the leader function is one of modifying the motivation and capability of group members to perform assigned duties.

The sample drawn for the first study (Lange et al., 1958) comprised 42 platoon leaders from two infantry regiments of a combat-ready division in the United States. Interviews with both superiors and subordinates obtained retrospective reports of actual behavior of the

platoon leaders in specified situations. Content analyses of these interviews resulted in the recognition of 140 "dimensions" of behavior and situational context, on which each incident of leader-follower interaction was scorable. Frequencies with which each leader performed various behaviors were related to ratings of the leaders by both subordinates and superiors. These two sets of judgments offered a pair of remarkably similar criteria. The leadership behaviors related to these criteria fell into five categories:

- (1) Giving information that facilitates the improvement of group performance.
- (2) Establishing high standards of expected performance.
- (3) Using reward and punishment appropriately.
- (4) Handling disruptive influences in the unit.
- (5) Obtaining information from group members on matters relating to the execution of the first four functions.

These findings were checked in a second study (Lange and Jacobs, 1960) in which a questionnaire instrument was developed to measure the variables identified. This instrument was used with junior officers in another combat division to measure the frequency with which leadership behaviors occurred. Results of the first study were confirmed and thus provided a comprehensive basis on which to develop leadership training.

Mention should be made of two HumRRO studies now in progress which bracket leadership training at both ends. In the first, a study of the college Army ROTC program has recently gotten under way. The second concerns leadership and the exercise of command at the division level. A source book is being prepared (Olmstead, 1964) which will integrate research results from a variety of behavioral sciences with practical military commentaries on the exercise of command at higher echelons. This work is intended to serve both as a reference volume for the Army Command and General Staff College and as a basis for planning research in the areas of high-level leadership and command.

Development of Training in Leadership

Noncommissioned Officers

The critical incidents collected by Hahn and associates on Navy petty officer behavior formed the basis for development of 15 role-playing situations which were also rendered in case study form (Trittipoe and Hahn, 1961; American Institute for Research, 1961a). After intermediate tests, final evaluation of both role playing and case study work was accomplished by measuring the agreement between assessments of student performance in this training by other petty officers and research personnel. Also, ratings of probable job performance and mutual rankings of men during discussion groups were obtained. Modest significant correlations were found among these three measures. Measures taken during this training showed substantial positive

relationships to performance in petty officer school, but only small and nonsignificant correlations with the next regular six-month performance evaluation on the job. During the course of this work a text on leadership for petty officers was prepared (Hahn and Tritt, 1961).

We return now to the Army study of NCO leadership to trace the development of a system for training potential noncommissioned officers during their first 16 weeks in the Army. Having made the study of existing NCO academies and completed the analyses of critical incidents collected in several Army divisions, referred to earlier, Hood and his research team moved toward the engineering phase of the work. Some kind of training system involving instruction and practice in leadership during Advanced Individual Training was the goal. Further studies relating to various aspects and options of possible training systems were made. A cooperative working relationship was established between the U.S. Army Personnel Research Office and HumRRO to handle selection aspects of the work.

First, a longitudinal study (Hood, 1963a) followed two companies of Reserve Forces Act trainees through their entire six-month career in the Army. Peer ratings, performance tests, written tests of knowledge, selection devices, and measures of motivation and attitudes taken during Basic, Advanced Individual, and Unit training were intercorrelated to provide background information on the kind of situation in which leadership training was to be developed. A second study examined the Advanced Individual Training program for possible shortening to make room for leadership training. In a third (Shovel, 1963), the attitudes of trainees toward the Army and their perceptions of the NCO's role were determined by questionnaire and interview techniques. In the fourth study, selected trainees were given leadership training concurrent with Advanced Individual Training where they occupied leadership positions (Sloan et al., 1963). In the final pilot study, a four-week training program in leadership and military subjects was given to selected graduates of Basic Combat Training, who went through Advanced Individual Training as acting squad leaders under the direction of "leadership NCO's" (Sloan et al.).

These studies provided information on three ways of combining leadership training and practice with Advanced Individual Training: (1) by recycling students for the second eight-weeks, (2) by integrating the training with the second eight-weeks, and (3) by a special course between the first and second eight-weeks. At this point in the development, these alternative solutions were discussed with Headquarters, U.S. Continental Army Command, the responsible Army Headquarters, to obtain guidance on which method would be most suitable for Army adoption. The short-course method was selected.

Beginning in January 1961, and continuing throughout most of the rest of the year, the main experiment took place. Principal interest was centered on the 400 trainee leaders who acted as squad leaders, and the 100 who acted as platoon sergeants. Also, data were obtained on

100 officers and 100 cadre sergeants commanding these trainees and on the 800 fire-team leaders and 3200 followers who were supervised by the trainee squad leaders.

In this complex Latin Square design, the following independent variables were involved: (1) aptitude level of the trainee leader, (2) peer rating of the trainee leader, (3) duration of the preparatory course, (4) nature of the training method, (5) supporting cost of the training method, (6) degree of training of the cadre, (7) differences in military occupational specialty of trainees, (8) differences between training companies to which student leaders were assigned.

Seven dependent variables included the following: (1) motivation and morale of trainee leaders, (2) global assessment of their leadership aptitude by peers, superiors, and followers, (3) specific observations of trainee leadership behavior by peers, superiors, and followers, (4) performance measures of the squads headed by trainee leaders, (5) written tests of leadership knowledge of trainee leaders, (6) measures of trainee leader's influence on followers, and (7) various administrative records.

Analysis of all these variables is now under way. One report on the climate for trainee leaders is currently available (Hood, 1963b). This report concludes: "It is clear that a 'leadership climate' influence can be discerned in the matrix of data, but its trace is not always direct or obvious."

Because of the Army buildup during the Berlin crisis in 1961, steps were taken by the Army to implement this work almost immediately after the conclusion of the experimental runs. Today there are leader preparation courses in operation in all Army Training Centers.

Officers

We return now to the work on junior Army officer training by Lange and his associates. Before they undertook the analyses of leadership behavior in combat-ready units described in two studies cited, the research team completed a study in leadership training media stemming from the work of Launor Carter. Sound motion pictures depicted real life leadership problems from garrison and combat. The films ended before the problem was solved by the leader in the story. Students then discussed and acted out various solutions for mutual criticisms under the guidance of an instructor using an instructor's manual prepared by the researchers. Army training films based on these prototypes have found extensive use in officer and noncommissioned officer training (Lange, Rittenhouse, and Atkinson, 1956).

Using the results of the research on leadership behavior referred to previously, and with the experience gained from developing the motion picture technique, the final engineering step in the program was completed (Jacobs, 1963). A 20-hour period of instruction was developed in which leadership problems were presented from audio tape recorders and students worked through a textbook in small unit leadership. This completed package, which includes an instructor's manual, was given several trial administrations with junior officers

at Fort Benning and was recommended for adoption in ROTC programs where it is now in use. While the developed training package has not been subjected to follow-up study against criteria which measure either the leadership behavior of the officer or the performance of his group, considerable user satisfaction has been expressed for the program. Its efficacy has been assumed because it was based on extensive research on leadership behavior.

During the course of these studies, Lange (1962) formulated a general theory of leadership behavior. He recognizes the importance of group codes and identifies the leadership functions of defining, motivating performance, handling disrupting influences, and getting information in terms of their effects on the formulation and enforcement of this code, which seems to determine so much of group performance.

A source of important research findings on behavior of junior Army officers is the Officer Prediction study now being conducted by the Army Personnel Research Office. Performance in situational criterion tests of both administrative and tactical knowledge and skill is being related to assessment variables and efficiency reports for a large sample of officers during their first tour of duty (Willemin, 1964).

ORGANIZATIONAL AND TECHNICAL ASPECTS OF COMMAND

Fundamental to the effective performance of a military leader at any echelon is technical competence in particular weapons, equipment, and tactics as well as understanding of the organizational and administrative relationships and responsibilities which are his. A number of HumRRO efforts have been and are devoted to this aspect of officer and noncommissioned officer training. In each case, a comprehensive task, ultimately directed toward the construction of a training program, has begun with a study of the military system in which the officer or NCO is to operate and a determination of his particular job characteristics (e.g., Cook, 1963, and Warnick and Baker, 1964). From these, requisite knowledges and skills are derived and training objectives formulated.

Research on Job Duties and Responsibilities

In the field of Armor a continuing series of investigations has been under way at the HumRRO Unit at Fort Knox. An early study in the United States and Europe determined the job requirements for tank crew members (Baker, 1958), including those of the tank commander. The latter's responsibilities include: (1) controlling the immediate activities of the tank under platoon leader command, (2) supervising the crew, (3) gathering, processing, and distributing information, and (4) performing operational duties. As a self-study aid, The Tank Commander's Guide was prepared (Cook, Warnick, and Baker, 1963).

At the platoon level in Armor, a study of the job requirements of the platoon leader (officer) and the platoon sergeant was made in 40 armored units in this country and Europe (Baker, 1961; Roach and

Baker, 1961). A list of more than 300 job duties, compiled from Army literature and interviews, was administered to approximately 400 officers in these units, from battalion commanders to platoon sergeants, for rating of combat importance. The same list served, with different instructions, for both platoon leader and platoon sergeant. In addition, written logs of all activities performed during the preceeding 48 hours were obtained from 166 platoon leaders and 257 platoon sergeants in operating units. From these data, schedules of combat job requirements were compiled for the two positions under study. Eight major duties, involving from 2 to 12 operations, were sorted out along with the reported knowledge factors and responsibilities associated with each. These extensive analyses provided the basis for a determination of the objectives of new training to be developed.

A similar line of investigation has been under way at the HumRRO Air Defense Unit at Fort Bliss. The platoon leaders for NIKE AJAX and HERCULES air defense missile crews have been studied through successive modifications of this system over the last several years (Ammerman, 1964a, 1964b).

Formulation of the job descriptions began with the preparation of provisional job descriptions based on review of manuals, attendance at school courses, interviews, and job observations (Darby et al., 1959). They were then checked in intensive interviews with all officers at 12 NIKE AJAX batteries and were criticized by competent agencies at Fort Bliss. From these revised job descriptions, training-need checklists were prepared and officers from 72 batteries were asked to judge selected activities for their jobs in terms of (1) importance for battery operation, (2) degree of proficiency required, and (3) priority for training (Darby, Brown, and Morse, 1959). Job requirements lists from this study were prepared for students in the Air Defense School officer courses. To keep up with the changes from NIKE AJAX to its successor, HERCULES, these job descriptions were revised by field interviews and observations, consultation of new manuals, and interviews at Air Defense Center agencies (Haverland and Fightmaster, 1960). A more refined analysis of junior Air Defense officer jobs is being completed by Ammerman (1964b).

A comparable kind of study of the job requirements for the junior infantry officer in combat is now under way at the HumRRO Unit at Fort Benning. Combat reports, vault files at the Infantry School, combat incident reports and analyses, and interviews in operationally ready units on maneuver in CONUS and Europe are providing the basis of a statement of job requirements and will supply a good deal of content material to supplement existing training.

Development of Training in Command

We turn now to the kinds of training programs in the exercise of command that are based on these background research studies. For use in informal training of tank commanders in their operating units, two forms of a standardized, simulated, combat mission test using

live tanks have been constructed (Schwartz and Floyd, 1963). Test-retest reliabilities, corrected for practice effects, range from .42 to .62. The test is diagnostic in nature.

For Armor platoon leaders and platoon sergeants, a set of 10 tactical training exercises was developed to provide practice in six essential combat skills and several aspects of platoon tactics (Baker et al., 1964). For indoor practice on these exercises, two miniature training devices were developed: (1) the Miniature Armor Battlefield, and (2) the Combat Decisions Game. The former may be used in training platoon leaders and tank crews, while the latter is for platoon leaders and tank commanders only. The Miniature Armor Battlefield is built to a scale of 1:25 and employs self-propelled miniature tanks, controlled by radio by the tank commander, seated on a movable platform with other crew and platoon members above the model terrain. The Combat Decisions Game, using a scale of 1:115 (HO gauge), requires tank commanders to move model tanks over a grid square with a pusher at a realistic speed. In both problems, platoon leaders communicate with their platoon commanders above and tank commanders below with standard tank radio equipment.

The effectiveness of the training given by each of these techniques was measured for experimental and control groups of platoon leaders with two instruments: (1) an objectively scored field test using real tanks and blank ammunition in a platoon mission against a live aggressor force (Baker and Cook, 1963), and (2) an essay-type test of 11 platoon-level combat problems requiring tactical decisions and command actions by the platoon leader. A written test of Armor knowledge was also used.

Results of the field testing of 20 experimental leaders trained on the Miniature Armor Battlefield and 20 controls indicated a significant superiority of 18.3% of trained over non-trained and a 5% superiority of trained over field-experienced platoon leaders not given these training exercises. Similar results obtained with the less elaborate Combat Decisions Game also favored the experimentally trained groups.

This study indicates the feasibility of providing realistic tactical training indoors. The extent to which those aspects of the tank platoon leader's job call for leadership, as opposed to sound tactical decision making, command, and control, is difficult to estimate. While offering variety of terrain and enemy action encountered, the situations probably were more nearly "established" than "emergent," in the terminology of Boguslaw and Porter (1962). To look at it another way, however, all tactical situations are by their very nature more or less emergent, requiring commanders to produce new solutions and new behaviors, which combine insightful tactical decisions with motivating leadership in implementation of these tactical choices. The motivational requirements are hard to simulate.

For the training of Air Defense officers, an on-site proficiency test has been built and tested (Morse et al., 1960), a refined method for determining the objectives of junior officers is nearing completion (Ammerman, 1964a), and programed instructional material is now under final test.

TEAM TRAINING

Having reviewed the current work on training for leadership and command, we turn now to investigations of team function and team training. While teams do not operate without leaders, and commanders have no functions apart from their units, it has been profitable to carry on research in which the team, rather than the leader, is the primary focus. The literature is much richer in theoretical studies and reports of laboratory experiments than in descriptions of training program development. Much is yet to be learned about teams before new techniques and principles can be applied to improve current practice. We have learned, however, from the original work by the Rand Corporation that when teams work together they learn and improve their performance. We have much to find out about how this learning occurs.

From his recent review of the literature, Glanzer (1962) concludes that the two most important aspects of team training needing further study are the processes of monitoring individual behavior and supplying feedback and reinforcement to team members. One conclusion from another recent comprehensive review by Boguslaw and Porter (1962) is that effective team training is best done on the job where both "established" and "emergent" situations occur, providing varied opportunities for learning by the crew. To dig a little more deeply into the variables which seem to influence crew effectiveness, George (1962) offers a detailed discussion of the literature from 1955 to 1962. He concludes that group codes are of paramount importance in determining motivation of group members, and that activation theory provides a guide to the understanding of the amount of group stimulation which will optimize efficiency. Additional conclusions by George will be discussed later when we come to an account of the work he is beginning on the training of infantry teams.

A wealth of recent summaries of laboratory experimentation is available (Glanzer and Glaser, 1959, 1961; Golenbiewski, 1962; Hare, 1962; Stogdill, 1959). Sophisticated analytical treatments of small group interactions were presented at the Stanford symposium in 1961 (Criswell, Solomon, and Suppes, 1962). Coming somewhat closer to the practicalities of military team training are some papers in Guetzkow's readings in simulation in social science (1962), and the Havron-McGrath chapter in Petrullo and Bass (1961), referred to previously. An instructive discussion on air crew training, between research and military personnel, occurred at Castle Air Force Base in 1960 (Hood *et al.*, 1960). Finally, recently developed techniques for studying team training are well summarized by Smode (1962).

Research on Team Function

The work of Alexander, Kepner, and Tregoe (1962) concerns the effectiveness of the knowledge of results in the performance of crews in air-direction centers. Four crews at four coastal locations were matched and placed in experimental and control groups. The

experimental group was given knowledge of results by careful and systematic debriefing exercises, while the control group had no post-action critiques. Results clearly favored the experimental group; these two crews showed more improvement in all functions than the control group. An important finding was that those functions which have the "highest visibility" improved most with the control group, while the less visible functions improved markedly in the experimental group having post-exercise discussions. It appears that team members learn from group experiences when the actions of the individuals can be clearly recognized. These findings tend to confirm earlier results of work by Horrocks and his associates on Navy crews (1959, 1960).

A more analytical approach to this problem has been taken by Glaser, Klaus, and Egerman (1962). From their "molar" approach, the team is considered as a single organism which exhibits the typical phenomena of individual learning. Team performance can be accounted for in terms of the amount of individual reinforcement provided each member from the reinforcement given to total team products. Suggestive conclusions concern the kind of reinforcement the individual can derive from knowledge of results of total team performance. Also, more precise indications are offered as to where and how supervisors can provide critical individual reinforcement.

In another laboratory-type study, Rogers, Ford, and Tassone (1961) addressed the important question of the effect of turnover in crew performance. In a simulated air defense problem, the effects were observed of introducing team members with varying degrees of individual and team experience into crews of varying crew experience. Degradation in crew performance or lack of improvement with experience varied with the stage of team experience of the crew and replacement experience. System performance was degraded and "... the concept of 'skill dilution' could be used to account for the direction and relative magnitude of the effect of turnover ..." on the experimental information-processing system. In this study, no training techniques to overcome this degradation in performance proved to be effective.

Development of Team Training

In the attempt to develop a program of training for B-52 aircraft pilot-navigator teams, Krumm and Farina (1962) studied existing missions provided by Standardization Boards. Five kinds of criterion measures were constructed, to be used in operational missions and during simulator training. Thirty-eight experimental and 37 control crews participated in the experiment. Small improvements in performances, especially for the navigators, were noted, but from the follow-up data from operational bases early reflections of improvement in experimental groups washed out rapidly.

During the course of the study, Krumm and Farina devoted considerable attention to crew coordinating activities and to categorizing the various kinds of communications on the intercom system. There was some evidence that voluntary inputs by crew members were significant

indices of crew coordination. This effort to discover some important intervening variables in crew coordination is significant in the attempt, if not in the actual finding.

Development of indoor training exercises for the Armored Reconnaissance Platoon is under way at the HumRRO Unit at Fort Knox. Following a survey of activities of platoon members (Cook, 1963), a training exercise employing a map terrain display and requiring appropriate decisions by key platoon members is under development. The armored cavalry platoon is unique in Army organization in that coordination between armor, infantry, and heavy mortar crews is required within the same platoon.

Team training of infantrymen offers some unique problems, since these teams have no large weapon or piece of equipment which defines their job duties. Toward the development of team effectiveness, George (1962) has proposed three kinds of manipulations designed to induce team effectiveness. First, there is the use of team training in situations designed to develop and reinforce the habit of coordinate behavior; the hypothesis is that such a habit will carry across situations and across groups. Second, there is the possibility of increasing resistance to high activation by exposing the team to gradual increases in pressure and suitable variation of the "central person" in the group. Finally, experimental training which enhances the task orientation of the position of formal leadership can be designed to increase the amount of task orientation in group code.

This work is now under way in a series of five experiments; one of which has been reported (George, Hoak, and Boutwell, 1963). Evidence has been accumulated that the conditions of training can be so arranged as to require teamwork among members of four-man rifle teams which will produce some 20% improvement on criterion problems. The criterion problems involve team firing on an advancing series of pop-up targets by the team as a whole; experimental treatments involve other kinds of team problems. Evidence from these experiments indicates that necessary characteristics of effective team training include the following demands:

- (1) A minimum performance level must be required of the team as a whole.
- (2) Teamwork—that is, sharing of work, compensating for each other—must occur to attain minimum criterion standards.
- (3) Team training must not be allowed to stop until criterion is reached.

During these experiments, increases in attitudes favorable to teamwork were shown to increase as team output went up, suggesting that it is possible to engender positive attitudes toward team performance and cooperation which will go with the individual as he joins new teams. One further aspect of this work is being reported at this convention (McRae, 1964). Evidence is presented for the development of a positive relationship between task-specific verbal team interaction

and improvement in team performance, but no relation has been found with team interaction of an organizational nature.

CONCLUDING REMARKS

In assessing the current state of research and development on leadership, command, and team training, I would make the following observations:

(1) Considerable gain in the effectiveness of leadership training has resulted from studies of what specific leadership acts are related to good team performance.

(2) Training which allows for student participation in leadership activity is proving to be effective.

(3) Instruction in the more impersonal duties of command has been enhanced through exhaustive studies of job responsibilities.

(4) Team training has been projected from studies which have specified the roles to be played by each team member in the small military group.

(5) The use of simulated situation training is becoming more sophisticated, and has provided means of analytic observations of behavior within teams.

(6) The nature of the kinds of individual behaviors on which teamwork depends, and means for developing these, is becoming more fully understood.

(7) Techniques are becoming available to develop positive attitudes of individuals toward teamwork.

REFERENCES

- Air Training Command. *Patterns of Technical Training*. with Foreword by Lt. Gen. James E. Briggs, ATC Pamphlet Number 52-1, Randolph AFB, Tex., July 1963.
- Alexander, L.T., Kepner, C.H., and Tregoe, B.B. "The Effectiveness of Knowledge of Results in a Military System-Training Program," *J. Applied Psychol.*, vol. 46, no. 3, 1962, pp. 202-211.
- American Institute for Research. *Situational Problems for Leadership Training: Part II—Situational Problems for Role Playing and Case Study Use*, Final Contract Report, AIR-B98-61-FR-253 (II), Washington, March 1961.
- American Institute for Research. *Situational Problems for Leadership Training: Part IV—Categorized Bibliography of Leadership Research Literature*, Final Contract Report, AIR-B98-61-FR-253 (IV), Washington, March 1961.
- Ammerman, Harry L. *Development of Procedures for Deriving Training Objectives for Junior Officers* (U.S. Army Air Defense Human Research Unit), Research Report in preparation, Human Resources Research Office, Alexandria, Va.
- Ammerman, Harry L. *Explanation and Description of Junior Officer Jobs* (U.S. Army Air Defense Human Research Unit), Research Report in preparation, Human Resources Research Office, Alexandria, Va.
- Baker, Robert A. *The Determination of Job Requirements for Tank Crew Members* (U.S. Army Armor Human Research Unit), Technical Report 47, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), May 1958.
- Baker, Robert A. *A Survey of Problems in the Tactical Training of Armor Units (U)* (U.S. Army Armor Human Research Unit), Technical Report 74, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), December 1961 (CONFIDENTIAL, Modified Handling Authorized).
- Baker, Robert A., and Cook, John G. *The Development and Evaluation of the Tank Platoon Combat Readiness Check*, Research Memorandum, U.S. Army Armor Human Research Unit (HumRRO), Fort Knox, Ky., April 1963.
- Baker, Robert A., Cook, John G., Warnick, William L., and Robinson, James P. *Development and Evaluation of Systems for the Conduct of Tactical Training at the Tank Platoon Level* (U.S. Army Armor Human Research Unit), Technical Report 88, Human Resources Research Office, Alexandria, Va., April 1964.
- Boguslaw, Robert, and Porter, Elias H. "Team Functions and Training," in *Psychological Principles in System Development*, Robert M. Gagné (ed.), Holt, Rinehart and Winston, New York, 1962, pp. 387-416.
- Bureau of Naval Personnel. *Utilization of Graduates of the Petty Officer Leadership Schools*, Bureau of Naval Personnel Memorandum, Pers-152 Memo 60-4, May 1960.

- Clark, Rodney A. *Leadership in Rifle Squads on the Korean Front Line* (U.S. Army Leadership Human Research Unit, now Training Center Unit), Technical Report 21, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), September 1955 (For Official Use Only).
- Cook, John G. *A Survey of Problems in the Tactical Training of Armored Cavalry Platoons*, Research Memorandum, U.S. Army Armor Human Research Unit (HumRRO), Fort Knox, Ky., January 1963 (For Official Use Only).
- Crawford, Meredith P. "Concepts of Training," in *Psychological Principles in System Development*, Robert M. Gagné (ed.), Holt, Rinehart and Winston, New York, 1962, pp. 301-342.
- Criswell, Joan H., Solomon, H., and Suppes, Patrick (eds.). *Mathematical Methods in Small Group Processes*, Stanford University Press, Stanford, Calif., 1962.
- Darby, Charles L., Brown, William F., and Morse, John L. *Weighted Scores, Ranks, and C-Scale Scores for Evaluated Activities of Job Descriptions of NIKE AJAX Battery Officers*, Research Memorandum (revised), U.S. Army Air Defense Human Research Unit (HumRRO), Fort Bliss, Tex., June 1959.
- Darby, Charles L., Brown, William F., Smith, Charles D., and Fightmaster, Walter J. *The Development of Job Descriptions for NIKE AJAX Battery Officers* (U.S. Army Air Defense Human Research Unit), Technical Report 54, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), April 1959.
- Department of the Army. *Military Leadership*, Field Manual 22-100, June 1961.
- Drucker, Eugene H. *The Effects of Differences in the Power, Authority, and Responsibility of Leaders on Team Performance* (U.S. Army Armor Human Research Unit), Research Report in preparation, Human Resources Research Office, Alexandria, Va.
- Eckstrand, Gordon. "Current Status of the Technology of Training," special invited presentation, read at meeting of APA, 1964.
- Fiedler, Fred E. *A Contingency Model for the Prediction of Leadership Effectiveness*, Technical Report No. 10, Group Effectiveness Research Laboratory, University of Illinois, Urbana, May 1963.
- Finan, John L. "The System Concept as a Principle of Methodological Decision," in *Psychological Principles in System Development*, Robert M. Gagné (ed.), Holt, Rinehart and Winston, New York, 1962, pp. 517-546.
- George, Clay E. *Some Determinants of Small-Group Effectiveness*, Research Memorandum, U.S. Army Infantry Human Research Unit (HumRRO), Fort Benning, Ga., October 1962.
- George, Clay E., Hoak, George R., and Boutwell, John. *Pilot Studies of Team Effectiveness*, Research Memorandum, U.S. Army Infantry Human Research Unit (HumRRO), Fort Benning, Ga., February 1963.
- Glanzer, Murray. "Experimental Study of Team Training and Team Functioning," *Training Research and Education*, Robert Glaser (ed.), University of Pittsburgh Press, Pittsburgh, 1962, pp. 379-407.
- Glanzer, Murray, and Glaser, Robert. "Techniques for the Study of Group Structure and Behavior: I. Analysis of Structure," *Psychol. Bull.*, vol. 56, no. 5, September 1959, pp. 317-332.

- Glanzer, Murray, and Glaser, Robert. "Techniques for the Study of Group Structure and Behavior: II. Empirical Studies of the Effects of Structure in Small Groups," *Psychol. Bull.*, vol. 58, no. 1, January 1961, pp. 1-27.
- Glaser, Robert, Klaus, David J., and Eggerman, Karl. *Increasing Team Proficiency Through Training: 2. The Acquisition and Extinction of a Team Response*, AIR-B64-5/62-TR, American Institute for Research, Washington, May 1962.
- Golembiewski, Robert T. *The Small Group: An Analysis of Research Concepts and Operations*, University of Chicago Press, Chicago, 1962.
- Gottheil, Maj. E. *The Relationship of Certain Leader and Squad Attributes to the Morale of Military Squads*, Technical Report No. 8, United States Military Academy, West Point, April 1963.
- Guetzkow, Harold Steere (ed.). *Simulation in Social Science; Readings*, Prentice-Hall, Englewood Cliffs, N.J., 1962.
- Hare, Alexander Paul. *Handbook of Small Group Research*, Free Press of Glencoe, New York, 1962.
- Hahn, Clifford P., and Trittipoe, Theresa G. *Situational Problems for Leadership Training: Part III--Review for Petty Officers of Leadership Research*, Final Contract Report, AIR-B98-61-FR-253 (III), American Institute for Research, Washington, March 1961.
- Haverland, Edgar M., and Fightmaster, Walter J. *The Revision of NIKE Platoon Leader Job Descriptions: AJAX to HERCULES* (U.S. Army Air Defense Human Research Unit), Technical Report 62, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), May 1960.
- Hood, Paul D. *Leadership Climate for Trainee Leaders: The Army AIT Platoon*, Research Memorandum, U.S. Army Leadership Human Research Unit (now Training Center Unit) (HumRRO), Presidio of Monterey, Calif., August 1963.
- Hood, Paul D. *Report of the Assessment Study Area of NCO II*, Research Memorandum, U.S. Army Leadership Human Research Unit (now Training Center Unit) (HumRRO), Presidio of Monterey, Calif., February 1963.
- Hood, Paul D. *Research on the Training of Noncommissioned Officers. Progress Report: NCO I*, Research Memorandum, U.S. Army Leadership Human Research Unit (now Training Center Unit) (HumRRO), Presidio of Monterey, Calif., July 1960.
- Hood, Paul D., Krumm, Richard L., O'Sullivan, Francis J., Buckhout, Robert, Cave, Richard T., Cotterman, Theodore E., and Rockway, Marty R. *Conference on Integrated Aircrew Training (March 1960)*, WADD Technical Report 60-320, Air Research and Development Command, Wright-Patterson AFB, Ohio, July 1960.
- Horrocks, John E., Krug, Robert E., and Heermann, Emil. *Team Training II: Individual Learning and Team Performance*, Technical Report NAVTRADEVCEEN 198-2, U.S. Naval Training Device Center, Port Washington, N.Y., August 1960 (Contractor: Ohio State University Research Foundation).
- Horrocks, John E., and Goyer, Robert. *Human Factor Analysis of Team Training*, Technical Report NAVTRADEVCEEN 198-1, U.S. Naval Training Device Center, Port Washington, N.Y., October 1959 (Contractor: Ohio State University Research Foundation).

- Jacobs, T.O. *A Program of Leadership Instruction for Junior Officers* (U.S. Army Infantry Human Research Unit), Technical Report 84, Human Resources Research Office, Alexandria, Va., June 1963.
- Kern, Richard P. *Observations on a Number of Noncommissioned Officer Academies*, Staff Memorandum, U.S. Army Leadership Human Research Unit (now Training Center Unit) (HumRRO), Presidio of Monterey, Calif., May 1958.
- Kipnis, D., Lane, W.P., and Frankfort, L. *Leadership Problems and Practices of Petty Officers*, Technical Bulletin 61-13, Bureau of Naval Personnel, August 1961.
- Kipnis, David, and Lane, William P. "Self-Confidence and Leadership," *J. Appl. Psychol.*, vol. 46, no. 4, August 1962, pp. 291-295.
- Krumm, Richard L., and Farina, Alfred J., Jr. *Effectiveness of Integrated Flight Simulator Training in Promoting B-52 Crew Coordination*, Technical Documentary Report No. MRL-TDR-62-1, Behavioral Sciences Laboratory, 6570th Aerospace Medical Research Laboratories, Aerospace Medical Division, Air Force Systems Command, Wright-Patterson AFB, Ohio, February 1962.
- Lange, Carl J. "Leadership in Small Military Units: Some Recent Research Findings," in *Defence Psychology; Proceedings of a Symposium Held in Paris, 1960*, Frank A. Geldard (ed.), Pergamon Press, New York, 1962, pp. 286-301.
- Lange, Carl J., Campbell, Vincent, Katter, Robert V., and Shanley, Fred J. *A Study of Leadership in Army Infantry Platoons* (U.S. Army Leadership Human Research Unit, now Training Center Unit), Research Report 1, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), November 1958.
- Lange, Carl J., and Jacobs, T.O. *Leadership in Army Infantry Platoons: Study II* (U.S. Army Infantry Human Research Unit), Research Report 5, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), July 1960.
- Lange, Carl J., Rittenhouse, Carl H., and Atkinson, Richard C. *Films and Group Discussions as a Means of Training Leaders* (U.S. Army Leadership Human Research Unit, now Training Center Unit), Technical Report 27, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), March 1956.
- McRae, Adie V. "Verbal Coordination and Performance in Small Military Teams," Abstract of presentation at meeting of APA, 1964, *Amer. Psychologist*, vol. 19, no. 7, July 1964, p. 555.
- Mayo, George Douglas, and DuBois, Philip H. "Measurement of Gain in Leadership Training," *Educ. Psychol. Measmt.*, vol. 23, no. 1, Spring 1963, pp. 23-31.
- Morse, John L., Brown, William F., Smith, Robert G., Jr., and Fightmaster, Walter J. *Measurement of the Job Proficiency of Nike Ajax Platoon Leaders* (U.S. Army Air Defense Human Research Unit), Technical Report 66, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), October 1960 (For Official Use Only).
- Oftiesh, Colonel Gabriel D. "Results of an Air Force Study of Programmed Instruction," remarks made at a symposium on an Air Force Study of Programmed Instruction, meeting of APA, 1963 (mimeographed).

- Olmstead, Joseph A. Jr. *Leadership at Senior Levels of Command* (U.S. Army Infantry Human Research Unit), book in preparation, Human Resources Research Office, Alexandria, Va.
- Petrullo, Luigi, and Bass, Bernard M. (eds.). *Leadership and Interpersonal Behavior*, Holt, Rinehart and Winston, Inc., New York, 1961.
- Roach, Eugene G., and Baker, Robert A. *The Determination of Combat Job Requirements for Tank Platoon Sergeant* (U.S. Army Armor Human Research Unit), Technical Report 69, Human Resources Research Office, Alexandria, Va. (published in Washington, D.C.), March 1961.
- Rogers, Miles S., Ford, John D., Jr., and Tassone, Jack A. "The Effects of Personnel Replacement on an Information-Processing Crew," *J. Appl. Psychol.*, vol. 45, no. 2, April 1962, pp. 91-96.
- Schwartz, Shepard, and Floyd, Arthur, Jr. *Improving Tactical Training for Tank Commanders: Test Development and Performance Assessment* (U.S. Army Armor Human Research Unit), Technical Report 82, Human Resources Research Office, Alexandria, Va., March 1963.
- Showel, Morris. *Report of the Leadership Orientation and Motivation Study Area of NCO II*, Research Memorandum, U.S. Army Leadership Human Research Unit (now Training Center Unit) (HumRRO), Presidio of Monterey, Calif., April 1963.
- Showel, Morris, and Peterson, Christian W. *A Critical Incident Study of Infantry, Airborne, and Armored Junior Noncommissioned Officers*, Staff Memorandum, U.S. Army Leadership Human Research Unit (now Training Center) (HumRRO), Presidio of Monterey, Calif., July 1958.
- Sloan, Samuel, Syx, Edward, Weiss, Warren, and Hood, Paul D. *Report of the Integrated and Informal Leadership Training and the Fundamental Leadership Skills Study Areas of NCO II*, Research Memorandum, U.S. Army Leadership Human Research Unit (now Training Center Unit) (HumRRO), Presidio of Monterey, Calif., May 1963.
- Smode, Alfred F. "Recent Developments in Training Problems, and Training and Training Research Methodology," *Training Research and Education*, Robert Glaser (ed.), University of Pittsburgh Press, Pittsburgh, 1962, pp. 429-495.
- Smode, Alfred F., Gruber, Alin, and Ely, Jerome H. *Human Factors Technology in the Design of Simulators for Operator Training*, Technical Report NAVTRADEVGEN 1103-1, Dunlap and Associates, Inc., Stamford, Conn., December 1963.
- Smode, Alfred F., Gruber, Alin, and Ely, Jerome H. *The Measurement of Advanced Flight Vehicle Crew Proficiency in Synthetic Ground Environments*, Technical Documentary Report No. MRL-TDR-62-2, Behavioral Sciences Laboratory, 6570th Aerospace Medical Research Laboratories, Aerospace Medical Division, Air Force Systems Command, Wright-Patterson AFB, Ohio, February 1962.
- Spector, Aaron J., Clark, Russell A., and Glickman, Albert S. "Supervisory Characteristics and Attitudes of Subordinates," *Personnel Psychol.*, vol. 13, no. 3, Autumn 1960, pp. 301-316.
- Stogdill, Ralph M. *Individual Behavior and Group Achievement: A Theory: The Experimental Evidence*, Oxford University Press, New York, 1959.

- Trittipoe, Theresa G., and Hahn, Clifford P. *Situational Problems for Leadership Training: Part I—Development and Evaluation of Situational Problems*, Final Contract Report, AIR-B98-61-FR-253 (I), American Institute for Research, Washington, March 1961.
- U.S. Continental Army Command. *Education and Training* (A Guide for the Potential Noncommissioned Officer), USCONARC Pamphlet No. 350-24, June 1963.
- Warnick, William L., and Baker, Robert A. *Determination of Combat Job Requirements for Armored Cavalry Platoon Personnel* (U.S. Army Armor Human Research Unit), Technical Report in preparation, Human Resources Research Office, Alexandria, Va.
- Warnick, William L., Cook, Lt. Col. John G., USA, Ret., and Baker, Robert A. (eds.). *The Tank Commander's Guide* (3d edition), with Foreword by Gen. Bruce C. Clarke, USA, Ret., The Stackpole Company, Harrisburg, Pa., September 1963.
- Willemin, Louis P. *Prediction of Officer Performance*, Technical Research Report 1134, U.S. Army Personnel Research Office, March 1964.
- Wolfe, Dael. "Training," in *Handbook of Experimental Psychology*, S.S. Stevens (ed.), John Wiley and Sons, Inc., New York, 1951, pp. 1267-1286.
- Ziller, Robert C. "Leader Assumed Dissimilarity as a Measure of Prejudicial Cognitive Style," *J. Appl. Psychol.*, vol. 47, no. 5, October 1963, pp. 339-342.